

Patent Claims

1. Method for authenticity testing a security element on the basis of liquid-crystalline materials, the security element having at least one marking with circularly polarizing material, comprising the steps
 - filtering the light impinging on the security element or the light reflected by it by means of a first circular polarizer for a first polarization direction and recording a first image of the security element,
 - filtering the light impinging on the security element or the light reflected by it by means of a second circular polarizer for a second polarization direction and recording a second image of the security element,
 - determining a differential image from the first and second image,
 - deriving a statement about the authenticity of the security element on the basis of the differential image.
2. Method according to claim 1, characterized in that as first and second circular polarizer a right-handed polarizer and a left-handed polarizer are used respectively.
3. Method according to one of the claims 1 or 2, characterized in that the security element is illuminated during the image recordings.
4. Method according to one of the claims 1 to 3, characterized in that during the recording of the first or the second image the first or the second circular polarizer is located between the security element and an apparatus for recording the image.
5. Method according to one of the claims 1 to 3, characterized in that during the recording of the first or the second image the first or the second circular

polarizer is located between an illumination apparatus and the security element.

6. Method according to one of the claims 1 to 3, characterized in that between the recording of the first image and the recording of the second image an automated change of the circular polarizer is effected.
7. Method according to one of the claims 1 to 5, characterized in that for recording each the first and the second image a separate image recording apparatus is used.
8. Method according to claim 7, characterized in that the first and the second image are recorded simultaneously.
9. Method according to the claims 7 or 8, characterized in that the recording of the first and the second image is effected via a common beam splitter, which is disposed between the two image recording apparatuses and the security element.
10. Method according to one of the claims 1 to 9, characterized in that as an image recording apparatus a video camera or a digital camera is used.
11. Method according to one of the claims 1 to 10, characterized in that the derivation of a statement about the authenticity of the security element is effected by an electronic evaluation of the differential image.
12. Method according to claim 11, characterized in that for the electronic evaluation of the differential image methods of digital image processing are used.
13. Method according to one of the claims 1 to 12, characterized in that the differential image is pictorially represented in a display device.
14. Method according to claim 13, characterized in that the representation of the differential image is effected on a monitor or a display.

15. Method according to claim 3, characterized in that the illumination of the security element is effected by a bundle of light guide fibres.
16. Method according to one of the claims 1 to 15, characterized in that before the determination of the difference in at least one of the two images or their data a correction is carried out.
17. Method according to one of the claims 1 to 16, characterized in that the result of the authenticity testing is transmitted encodedly or is passed on provided with an electronic signature.
18. Method according to one of the claims 1 to 17, characterized in that the authenticity testing is carried out on a security element, which is a deposit token of a container.
19. Apparatus for authenticity testing a security element on the basis of liquid-crystalline materials, the security element having at least one marking with circularly polarizing material and the apparatus comprising the following components
 - at least one left-handed circular and one right-handed circular polarizer,
 - at least one image recording apparatus for recording one or several image(s) of the security element,
 - means for determining a differential image.
20. Apparatus according to claim 19, characterized in that means for an autonomous evaluation of the differential image are present.
21. Apparatus according to claim 19 or 20, characterized in that it has means for storing the intensity values of the partial areas of one or several image(s).
22. Apparatus according to one of the claims 19 to 21, characterized in that it has an illumination apparatus.

23. Apparatus according to claim 22, characterized in that as an illumination apparatus a bundle of light guide fibres is provided.
24. Apparatus according to one of the claims 19 to 23, characterized in that between the security element and an image recording apparatus a circular polarizer is disposed.
25. Apparatus according to claim 22 or 23, characterized in that between the illumination apparatus and the security element a circular polarizer is disposed.
26. Apparatus according to one of the claims 19 to 25, characterized in that means for an automatic change of a circular polarizer are present.
27. Apparatus according to one of the claims 19 to 25, characterized in that it has two image recording apparatuses.
28. Apparatus according to claim 27, characterized in that between the security element and the image recording apparatuses a beam splitter is disposed.
29. Apparatus according to one of the claims 19 to 28, characterized in that it has a display device for representing the differential image.
30. Apparatus according to one of the claims 19 to 29, characterized in that as image recording apparatus/es at least one digital or video camera is provided.
31. Apparatus according to one of the claims 19 to 24, characterized in that the left-handed circular and the right-handed circular polarizer are combined in one circular polarizer in such a way, that left-handed circular and right-handed circular areas alternate in a checkerboard fashion, and this combined circular polarizer is disposed directly in front of the image detector of an imaging apparatus.

32. Apparatus according to one of the claims 19 to 31, characterized in that in the beam path in front of at least one of the image recording apparatuses at least one colour filter is disposed.